PINEMAP's DSS: Past, Present, and Future

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2016 PINEMAP Annual Meeting

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Athens, GA

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agricultural Project funded by the USDA National Institute of Food and Agriculture

USDA United States Department of Agriculture National Institute of Food and Agriculture

These are drop down menu topics

PINEMAP

Get Started - Novice | Advanced User View | Tools & Tips | PINEMAP Concepts

USDA

Get Started ➔ Stand Parameters: Location

Observation Time

« Previous Day (Aug 26 at 4 pm) ‹ Previous Hour (Today at 3 pm) Currently Viewing (Today at 4 pm)

○ Most current ob (Today at 4 pm) ○ Custom date/time

Location

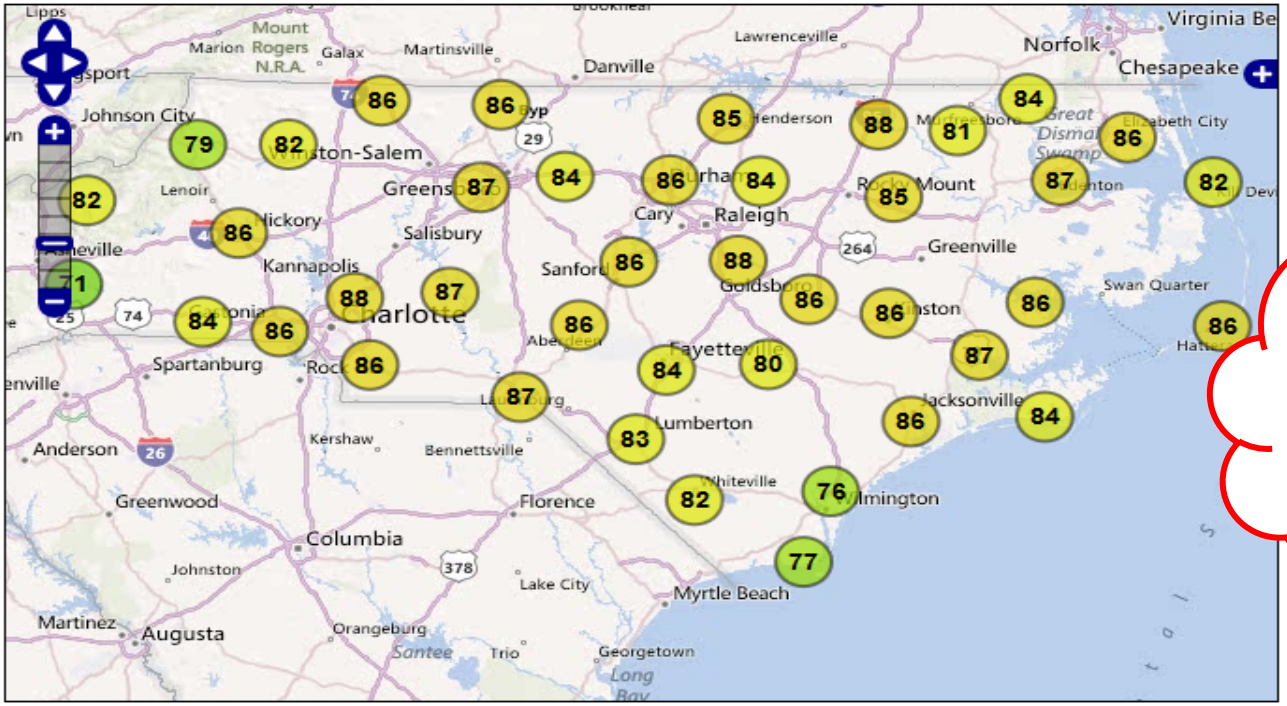
◉ Use my current zoom level & location
○ Zoom to a state ○ Zoom to a county

Point Data

◉ Show one parameter
Air temperature
○ Show four parameters

Gridded Data

MPE: Diff. from normal precip.



Fall 2012

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PINEMAP

Choose Your Location of Interest

Step 1: Choose your location of interest by clicking on the map. The native loblolly pine range is outlined in green.

OR Enter your own latitude and longitude values here:

Latitude: 35.210844 *and Longitude:* -77.563477 NOTE: Use negative values for west longitudes.

OR Enter your own location information here:

Location: NOTE: Location can be an address, zip code, or city/county and state (eg. Raleigh, NC).

Step 2: Stand Progression - Where is your stand in life?

- New Stand
- Existing Stand
- Not Sure

Step 2a: What is the species mix?
What is the age?
What is the density?
Have you done past management? If yes, what type?

Step 3: For more information about this location and for guidance on decisions related to establishment, intermediate stage, and regeneration at this site, click this button: Submit

Location Information

Latitude: 35.210844
Longitude: -77.563477
Soil Group: CRIFF C
Stand Progression: Existing Stand

Average Annual Extreme Minimum Temperature: 15°F
Average Annual Precipiation: 46.4inches
Current US Drought Monitor Intensity: Moderate

Historical Environmental Conditions | Possible Future Pressures | Establishment Decisions | Intermediate Decisions | Regeneration Decisions

Historical Environmental Conditions

To view the tools in each category, click on the title.

Weather and Climate

- **What is the weather and climate like?**
  Research/Tools: PRISM data at tier sites
- **What are the rain patterns including timing of the rain?**
  Research/Tools: PRISM data at tier sites
- **What are the temperatures including nighttime temperatures?**
  Research/Tools: PRISM data at tier sites
- **What are the seasons -- e.g. start and end periods for frost/freezes, growing season, etc.?**

Soils

Other environmental conditions

Markets

Productivity

Other

planting, site prep, vegetation control, nutritional management, ecosystem services, harvest, etc.

Fall 2013

Location Currently set to near Lake Butler, FL. (hide details)

Choose a stand location by clicking on the map:

OR enter your location: 29.96N 82.44W Map

Submit

Details for your submitted location:

Latitude & Longitude: 29.96°N 82.44°W

Closest Tier 1 Site: Site 1 near Lake City, FL
(14.9 miles away)

Avg. Extreme Min. Temperature: 20°F
(avg. annual minimum temp. from 1979 to 2011)

Avg. Annual Precipitation: 52.8 inches

Current Drought Intensity:

No drought
(for 100% of Union County as of Feb 18)

Winter 2013-14

Historical Conditions | Possible Future Pressures | Establishment Decisions | Intermediate Decisions | Regeneration Decisions

Weather and Climate | Soils | Other Environmental Conditions | Productivity | Other

Choose a question from one of the categories and subcategories in the menus above.

Are we in a drought?

Is there ample moisture in the soil?

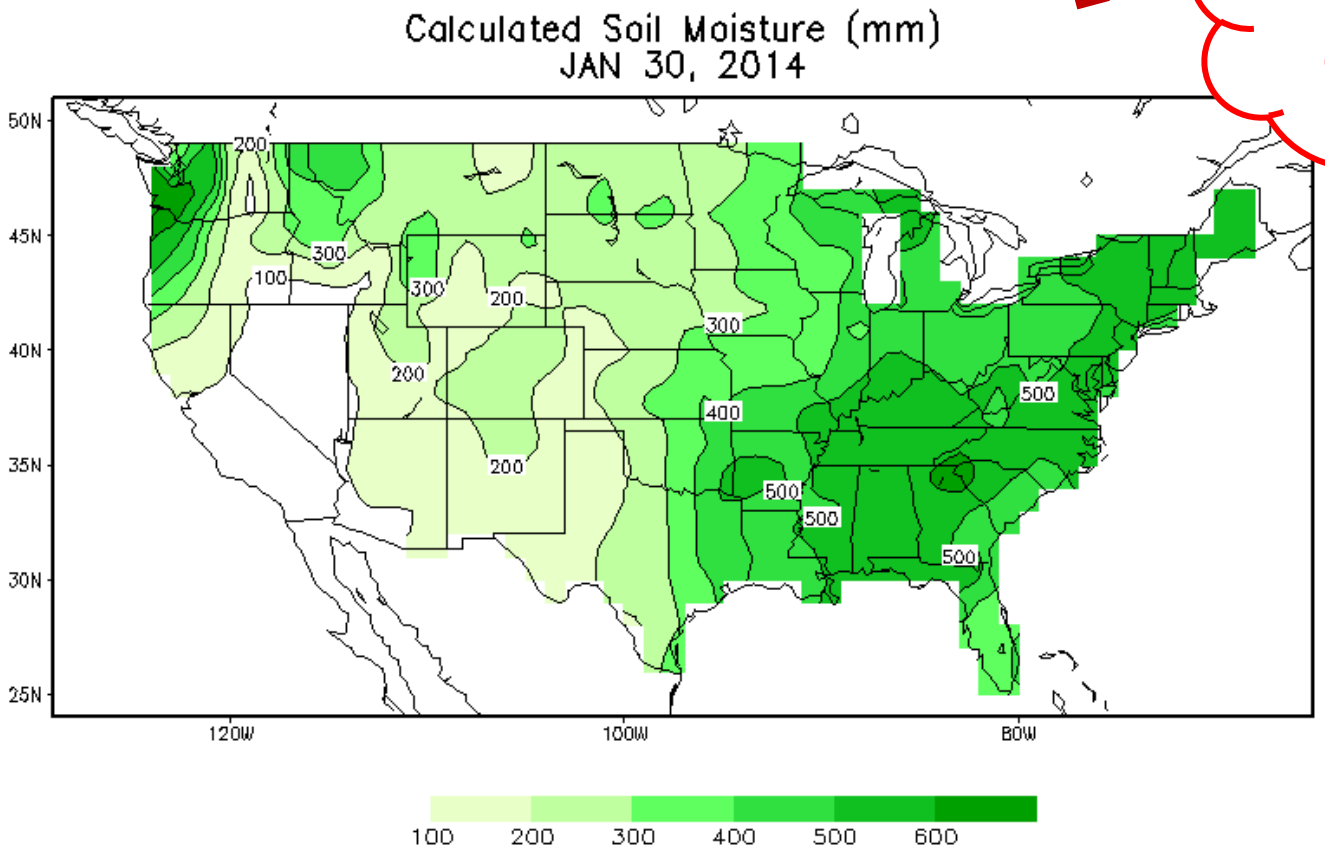
What are the weather conditions (temperature, wind speed, etc.) now and for the next 1-3 months?

If I plant in the next 1-3 months, what is the chance of failure and replanting?

Clicking here populates content below

Here are the current values of soil moisture according to the Climate Prediction Center:

Winter 2013-14



Environment | Establishment | Management | Production

Temperature | Precipitation | Drought | Other Weather Conditions | Soils | **Water**

Select a tool: Water supply and demand

Historical dataset (1986 to 2005):
- Observations
- Model baseline data

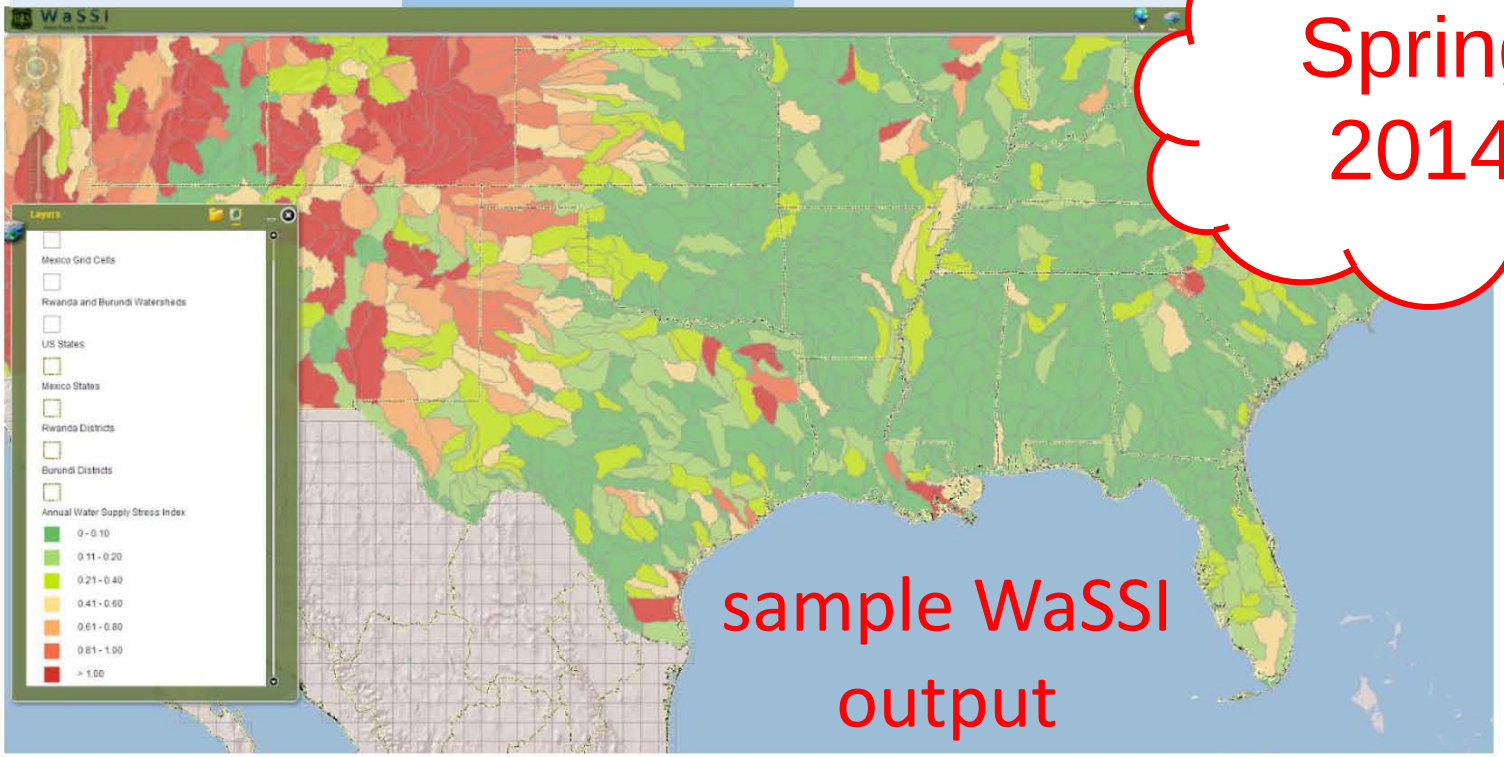
Future projections:
- Period: 2061 to 2080

Output: Annual water supply stress index

RCP scenario: 4.5

Display

Minimum projected change | Mean projected change | Maximum projected change



Spring 2014

sample WaSSI output

Other Resources:

- Water Supply Stress Index Fact Sheet
- Background: WaSSI

PINEMAP

Mapping the future of southern pine management

How does future climate influence pine productivity?

Environment | Establishment | Management | **Production**

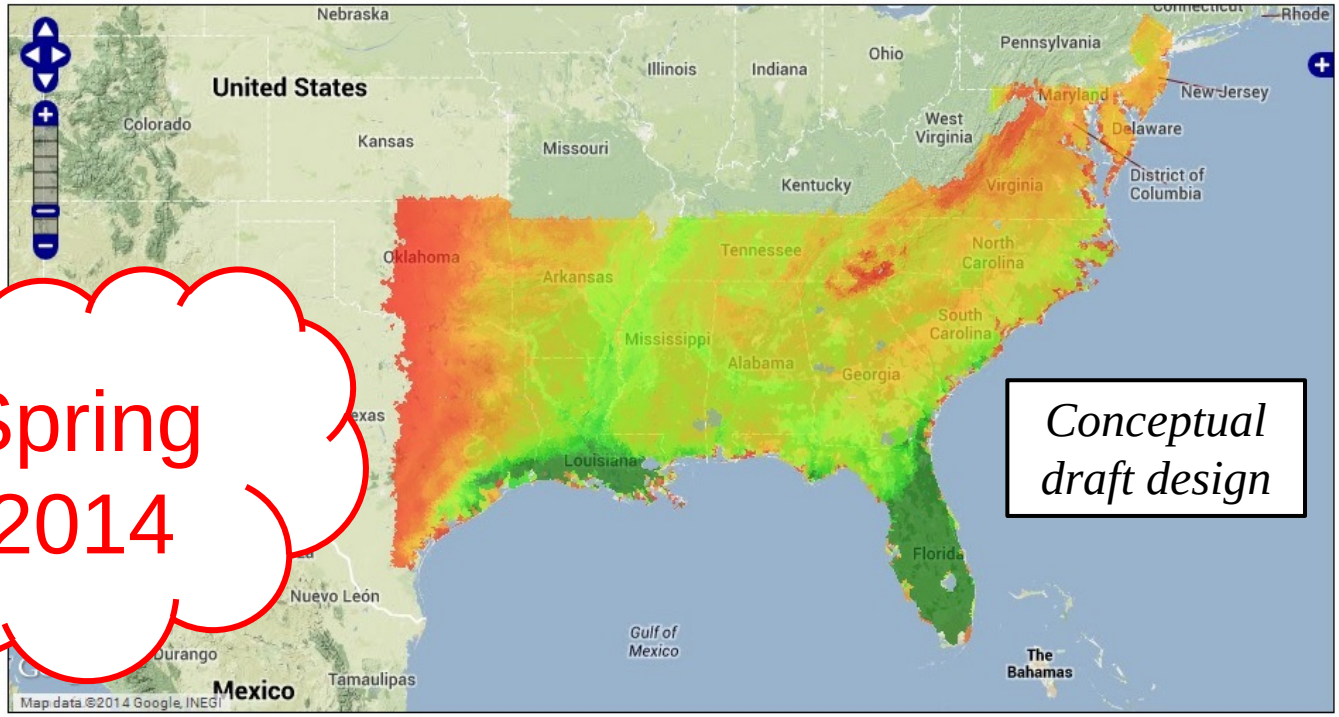
Carbon Sequestration | **Tree Production** | Markets

Select a tool: Growth & Yield Model: Green Weight

Year: 2014 | Display

RCP scenario: Intense (8.5)

Management scenario: Baseline (control)



Spring 2014

Conceptual draft design

Green weight (tons per acre)

0 50 100 150 200 250

Other Resources

Virginia Tech's Forest Modeling Research Cooperative

For more information on this data, contact Dr. Harold Burkhart at Virginia Tech University.

Environment | Establishment | Management | Production

Temperature | Precipitation | Drought | Other Weather Conditions | Soils | Water

Select a tool: Extreme minimum temperature frequency

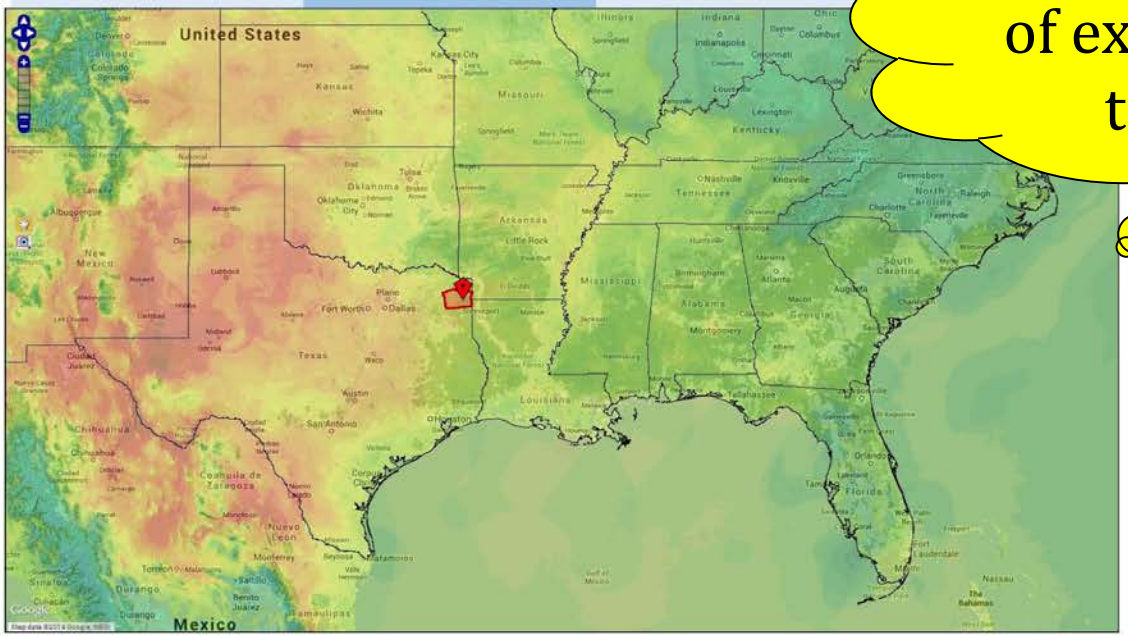
Historical dataset (from 1986 to 2005):
- Observations
- Model baseline data

Future projections:
- Period: 2061 to 2080

Temp. threshold: 20°F
Season: Winter (DJF)
RCP scenario: 4.5

Display

Minimum projected change | Mean projected change | Maximum projected change

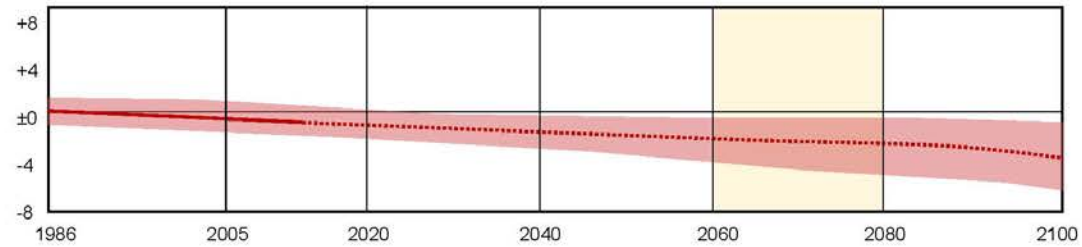


Mean projected change in days per year with minimum temperatures < 20°F for the period from 2061 to 2080 (reference period: 1986 to 2005)

-10 -8 -6 -4 -2 0

At your location:

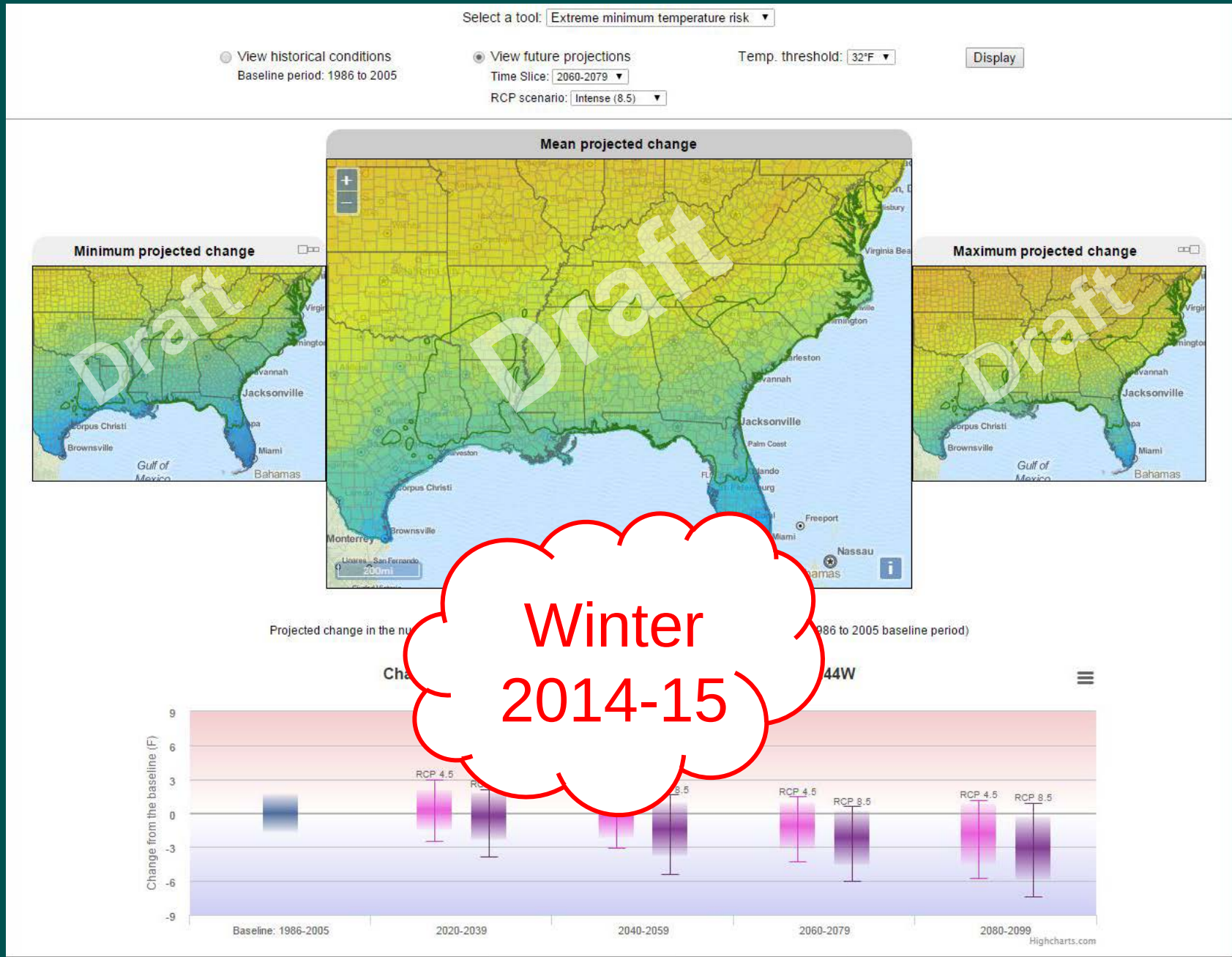
Region: Cass County, TX Baseline: 12 ± 3.2 days Projected Change: -2.8 ± 2.1 days



What are projections of extreme minimum temperature?

Spring 2014

Prototype: Extreme Min Temp Risk Tool



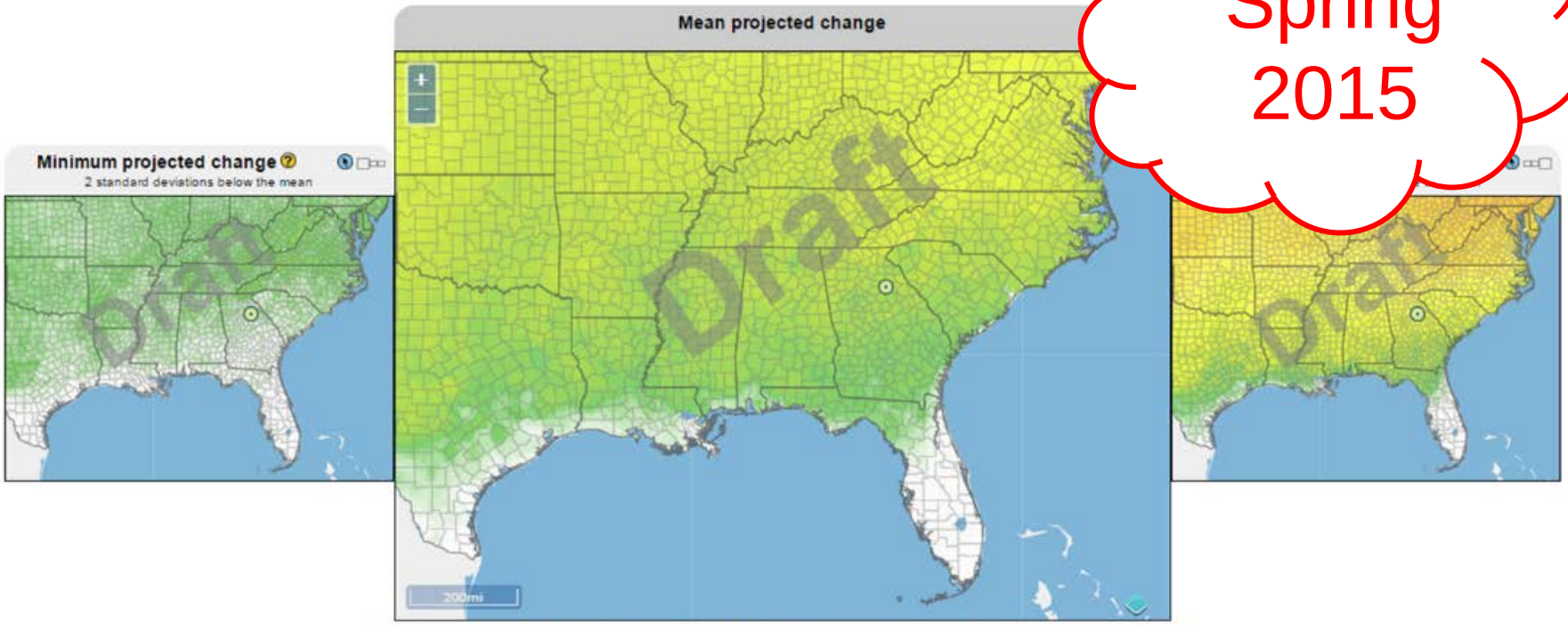
Extreme Minimum Temperature Risk

Temperature threshold: 32°F ▾
Future time slice: 2040 to 2059 ▾
Climate change scenario: Intense warming ▾

Selected location: 33.9°N 83.41°E (near Athens, GA 30606, USA)

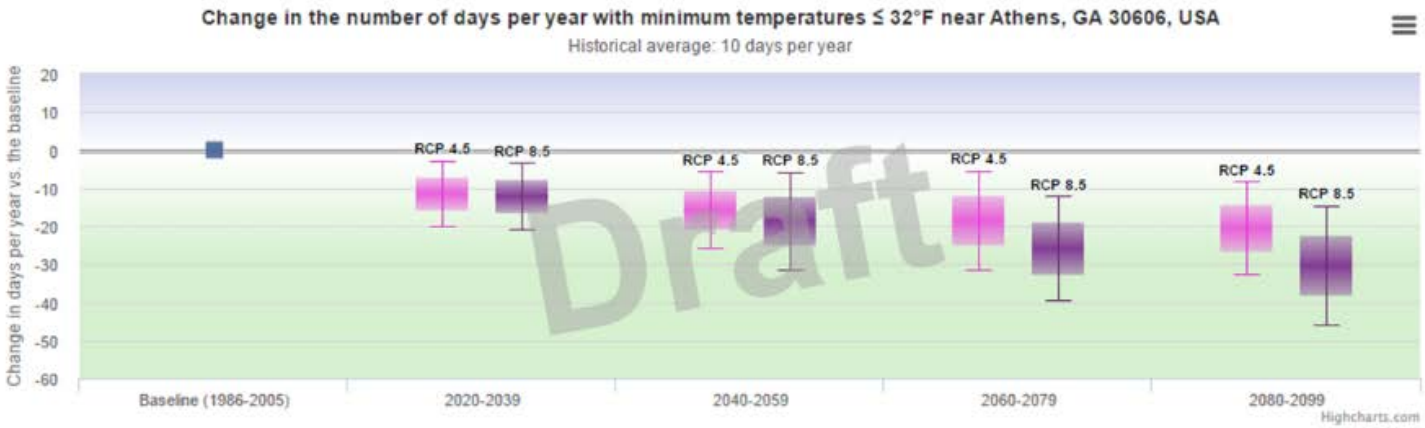
Map layers: County lines | Native loblolly range | Shaded eleva

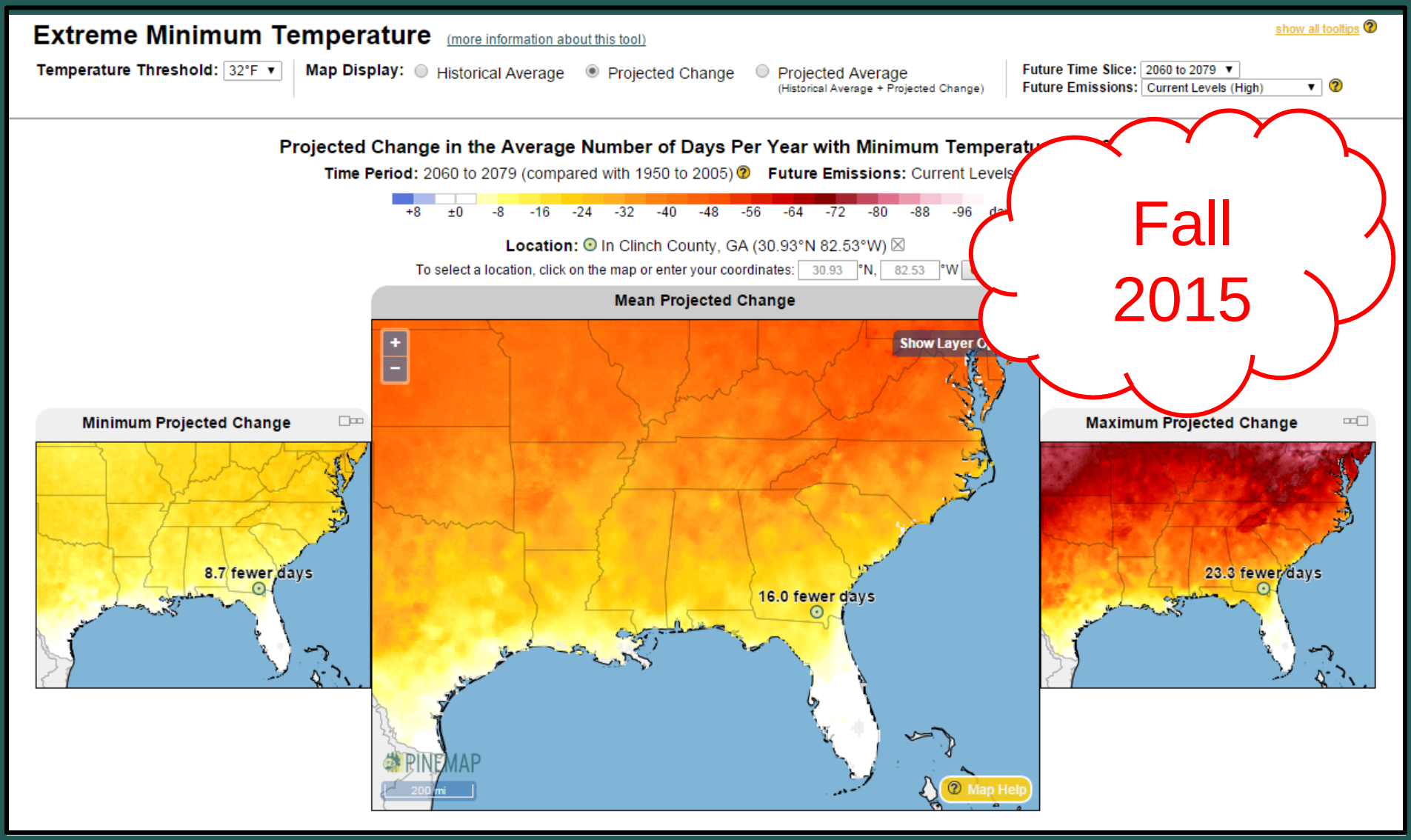
Spring 2015



Projected **change in the number of days per year** with minimum temperatures ≤ 32°F for the 2040 to 2059 period
(compared to the 1985 to 2005 baseline period)

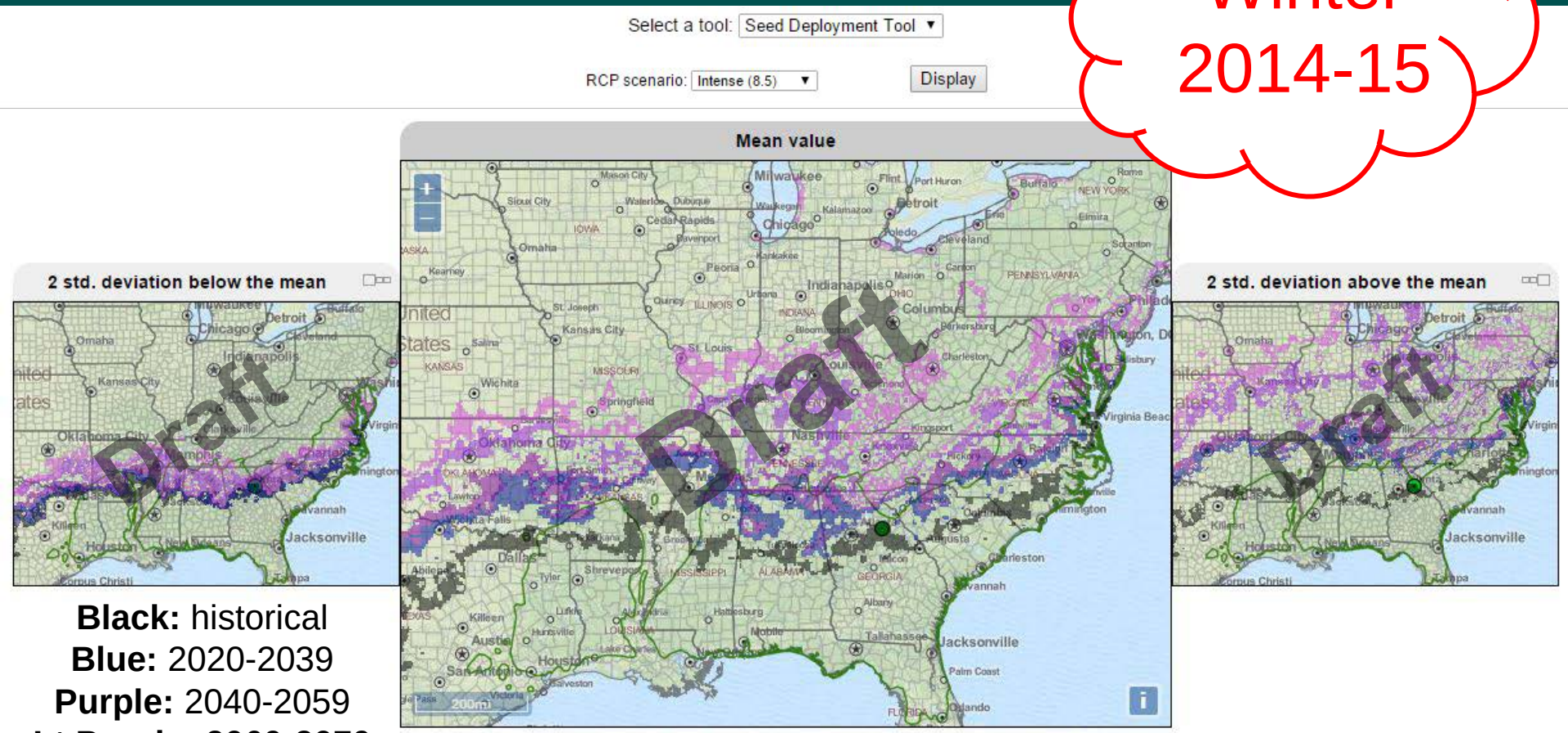
+8 ±0 -8 -16 -24 -32 -40 -48 -56 -64 -72 -80 -88 -96




Extreme Minimum Temperature
(more information about this tool)
show all tooltips
Temperature Threshold: 32°F
Map Display: Historical Average Projected Change Projected Average
(Historical Average + Projected Change)
Future Time Slice: 2060 to 2079
Future Emissions: Current Levels (High)
Projected Change in the Average Number of Days Per Year with Minimum Temperatu
Time Period: 2060 to 2079 (compared with 1950 to 2005)
Future Emissions: Current Levels
+8 ±0 -8 -16 -24 -32 -40 -48 -56 -64 -72 -80 -88 -96
Location: In Clinch County, GA (30.93°N 82.53°W)
To select a location, click on the map or enter your coordinates: 30.93 °N, 82.53 °W
Mean Projected Change
Show Layer O
Minimum Projected Change
8.7 fewer days
16.0 fewer days
Maximum Projected Change
23.3 fewer days
PINEMAP
200 mi
Map Help
Fall
2015

Prototype: Seed Deployment Tool
Athens, GA
RCP 8.5

Winter 2014-15



Black: historical
Blue: 2020-2039
Purple: 2040-2059
Lt Purple: 2060-2079
Pink: 2080-2099

Spring 2015

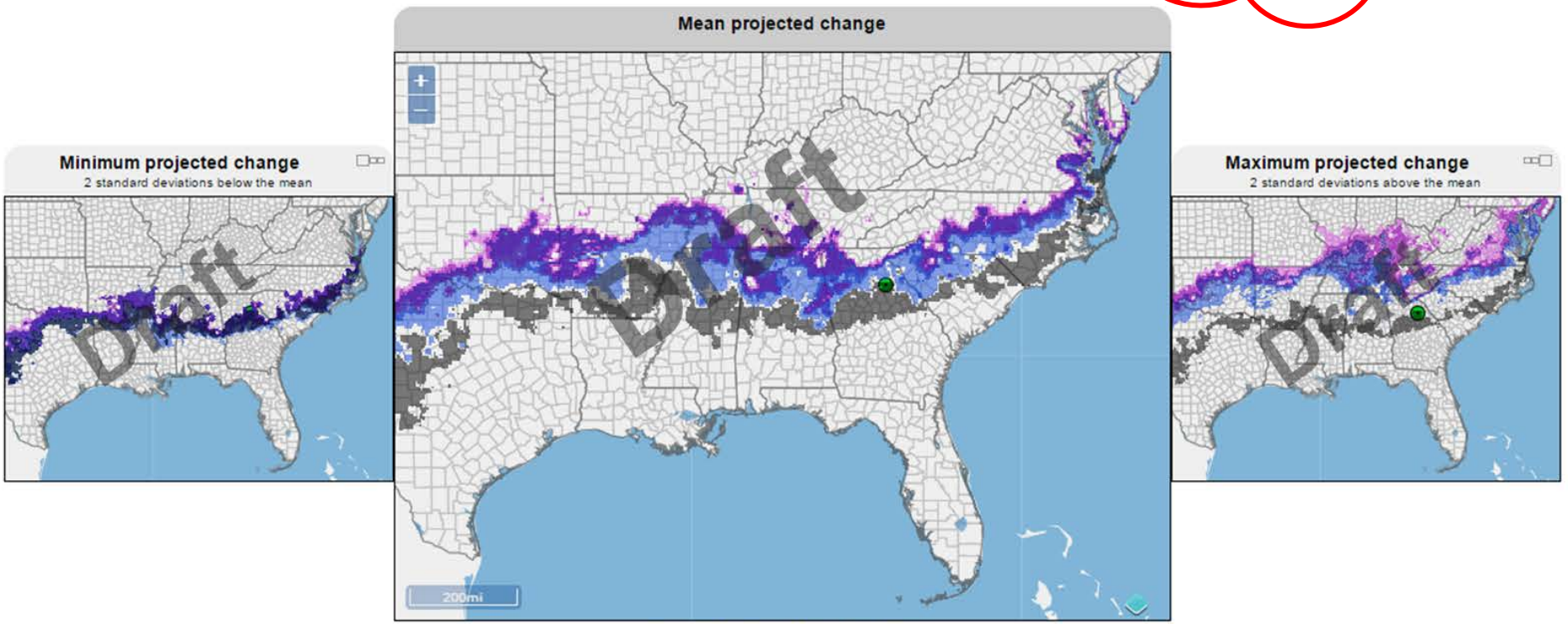
Seed Movement Tool

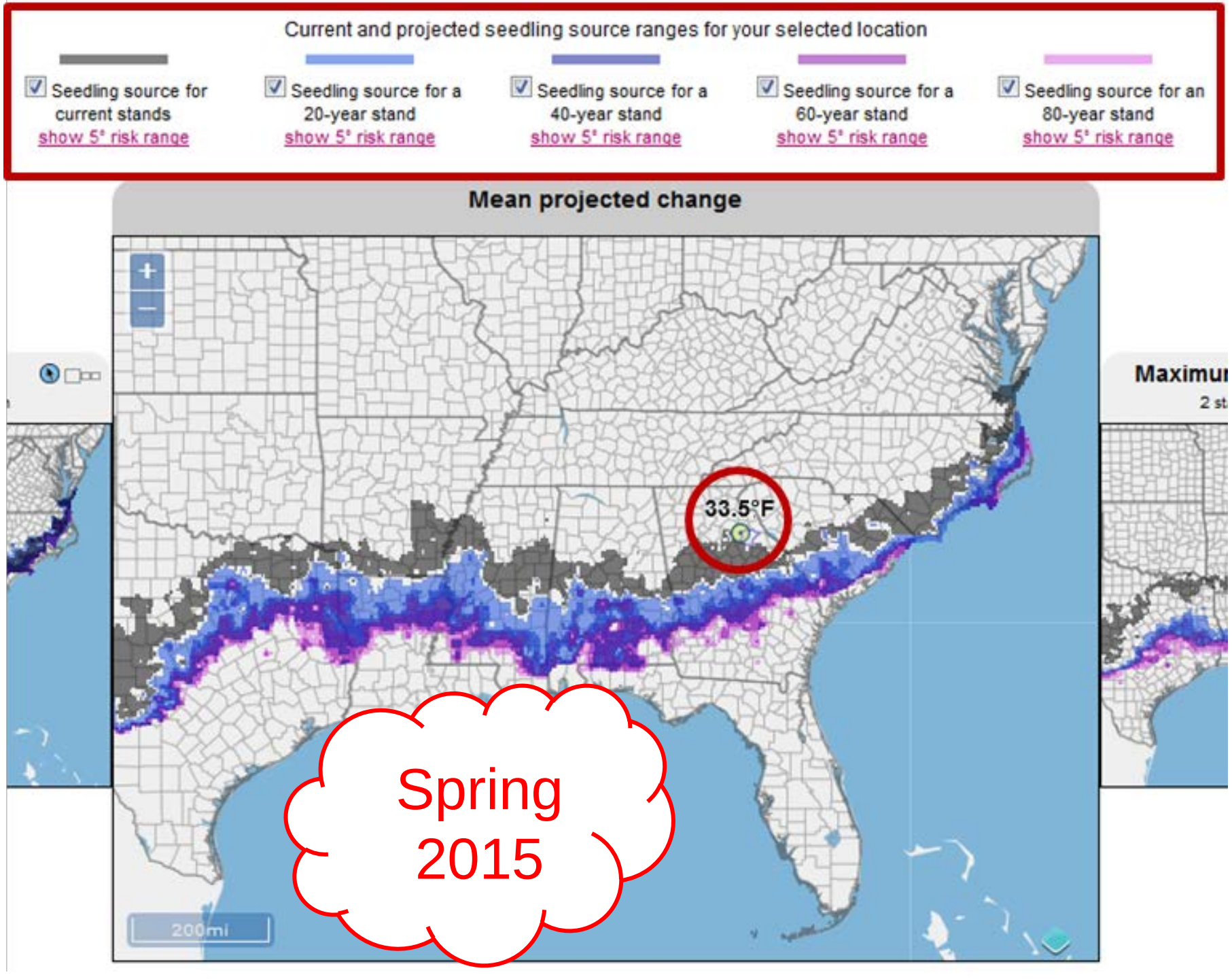
Map display:
- Historical isotherms
- Projected isotherms

RCP scenario: Moderate (4.5)

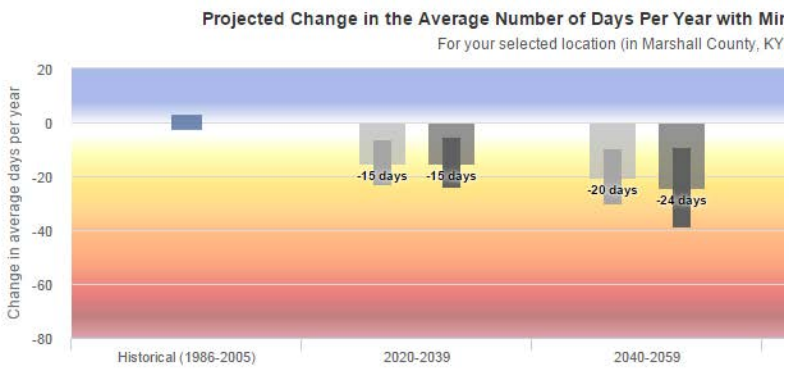
Selected location: 33.97°N 83.41°W (near Athens, GA 30606, USA)

Map layers: County lines | Native loblolly range | Elevation base map

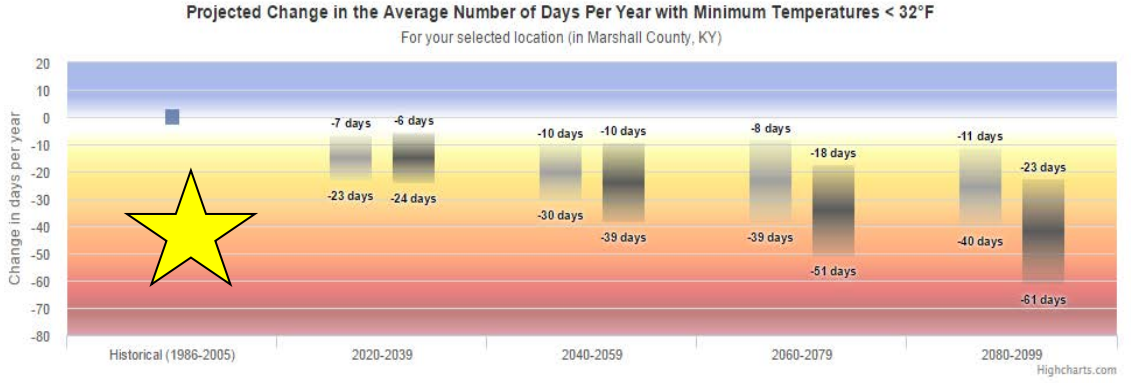



Current and projected seedling source ranges for your selected location
Seedling source for current stands
show 5° risk range
Seedling source for a 20-year stand
show 5° risk range
Seedling source for a 40-year stand
show 5° risk range
Seedling source for a 60-year stand
show 5° risk range
Seedling source for an 80-year stand
show 5° risk range
Mean projected change
33.5°F
200mi
Spring
2015

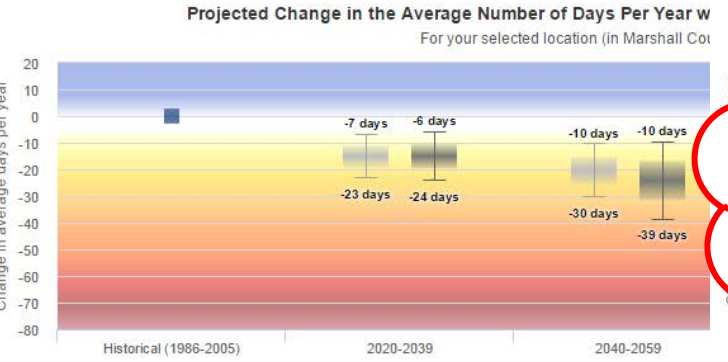
A



B

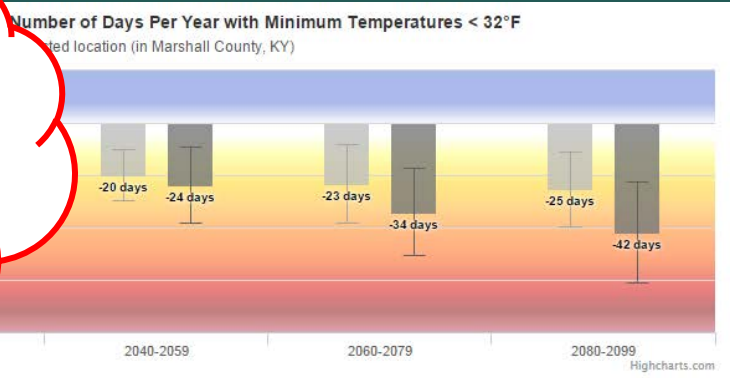


C

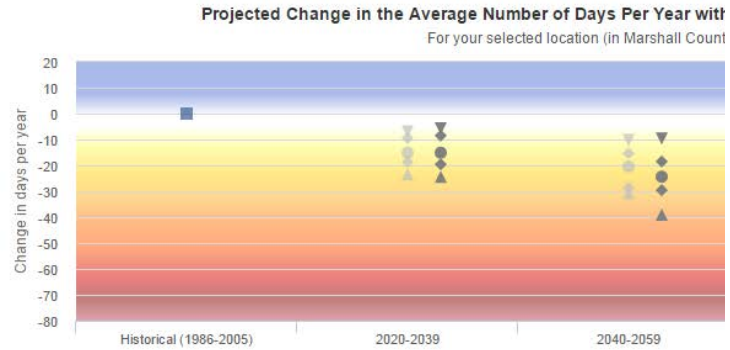


Summer 2015

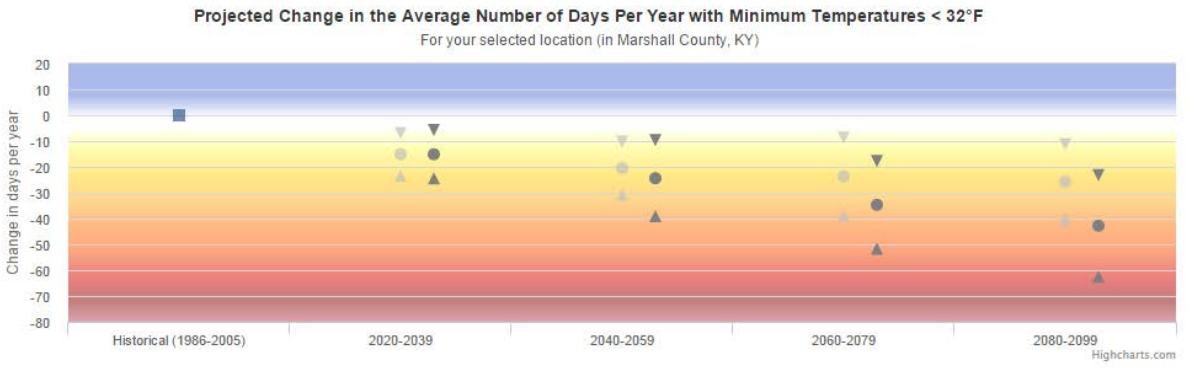
D



E



F



Eye Tracking Study

- Conducted by researchers from NCSU Geocognition lab
- At the **Appalachian Society of American Foresters meeting** on Jan. 28-29 in Durham, NC
- **31 participants** ranging from young to old, students to state, federal forestry to private, non-profit forestry

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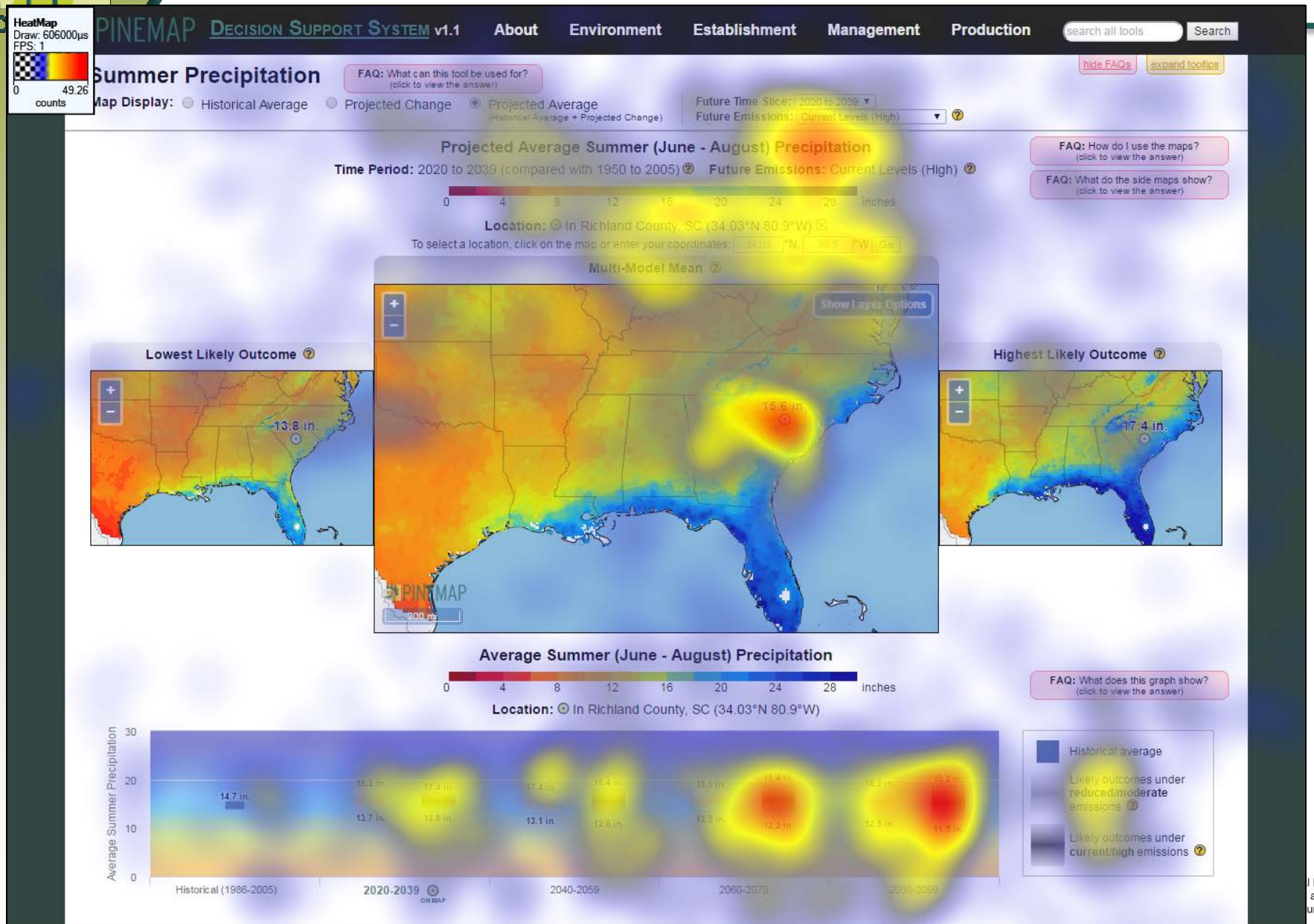
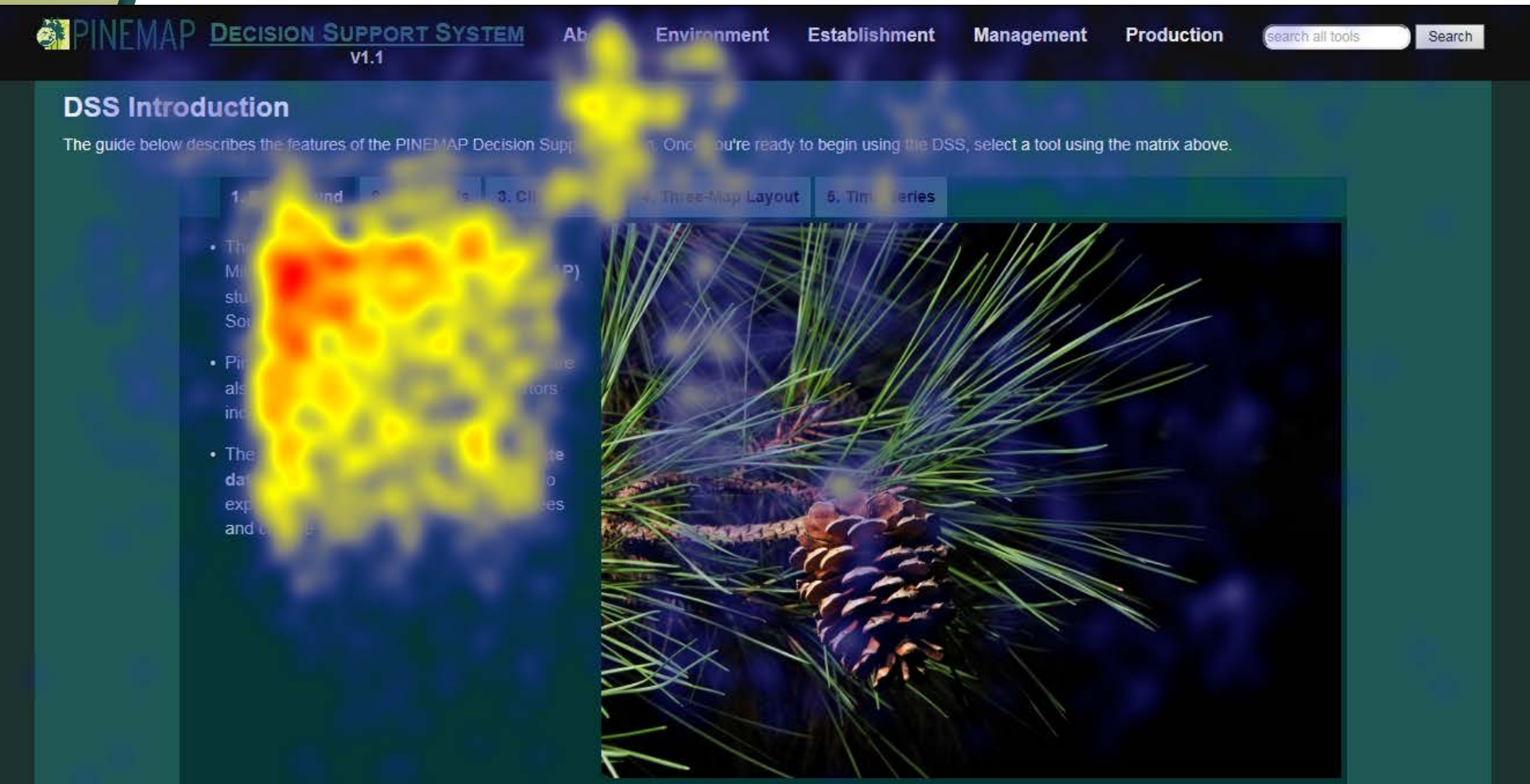
Example Eye Tracking Heat Map



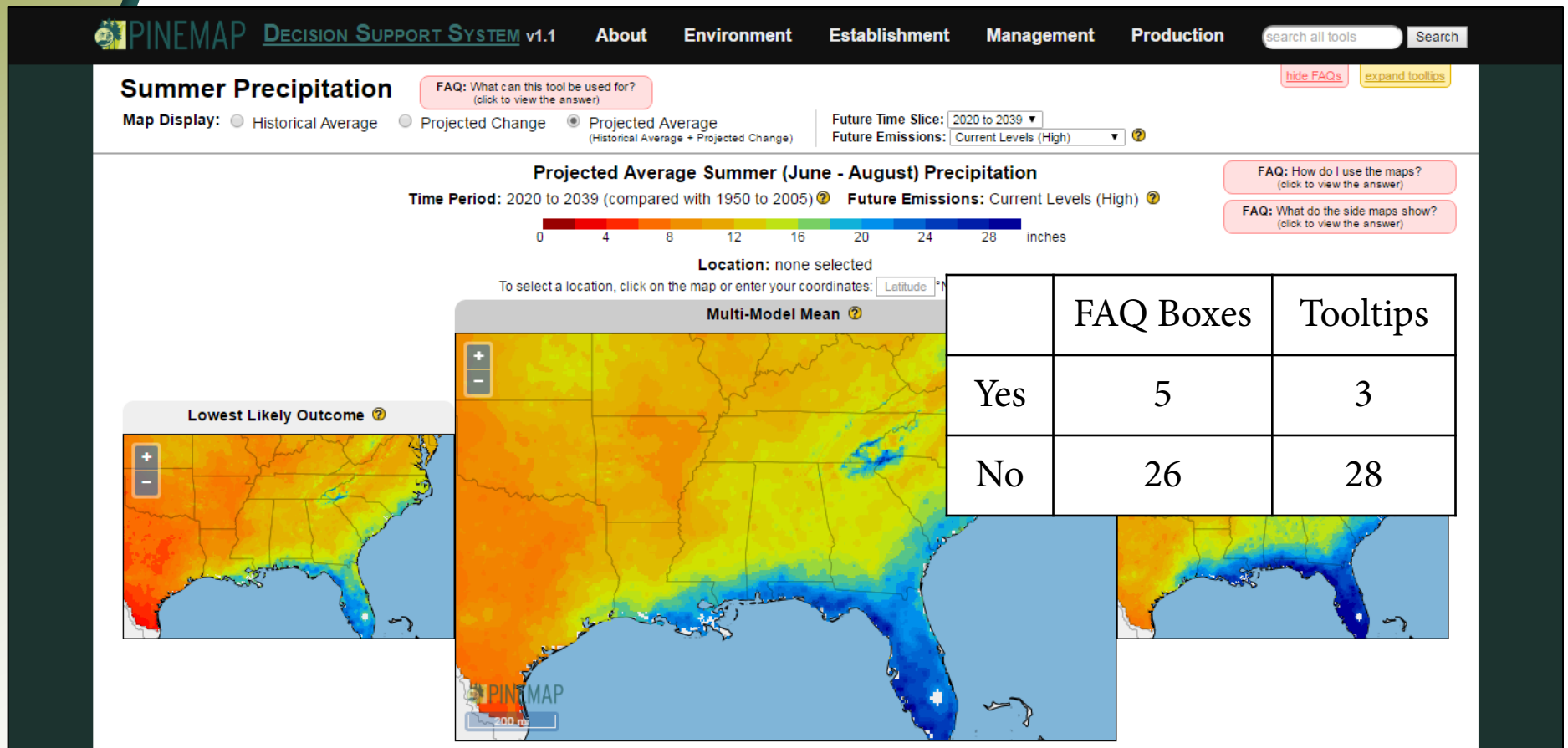
Usability Issues Identified

- Users read text in an F pattern



Usability Issues Identified

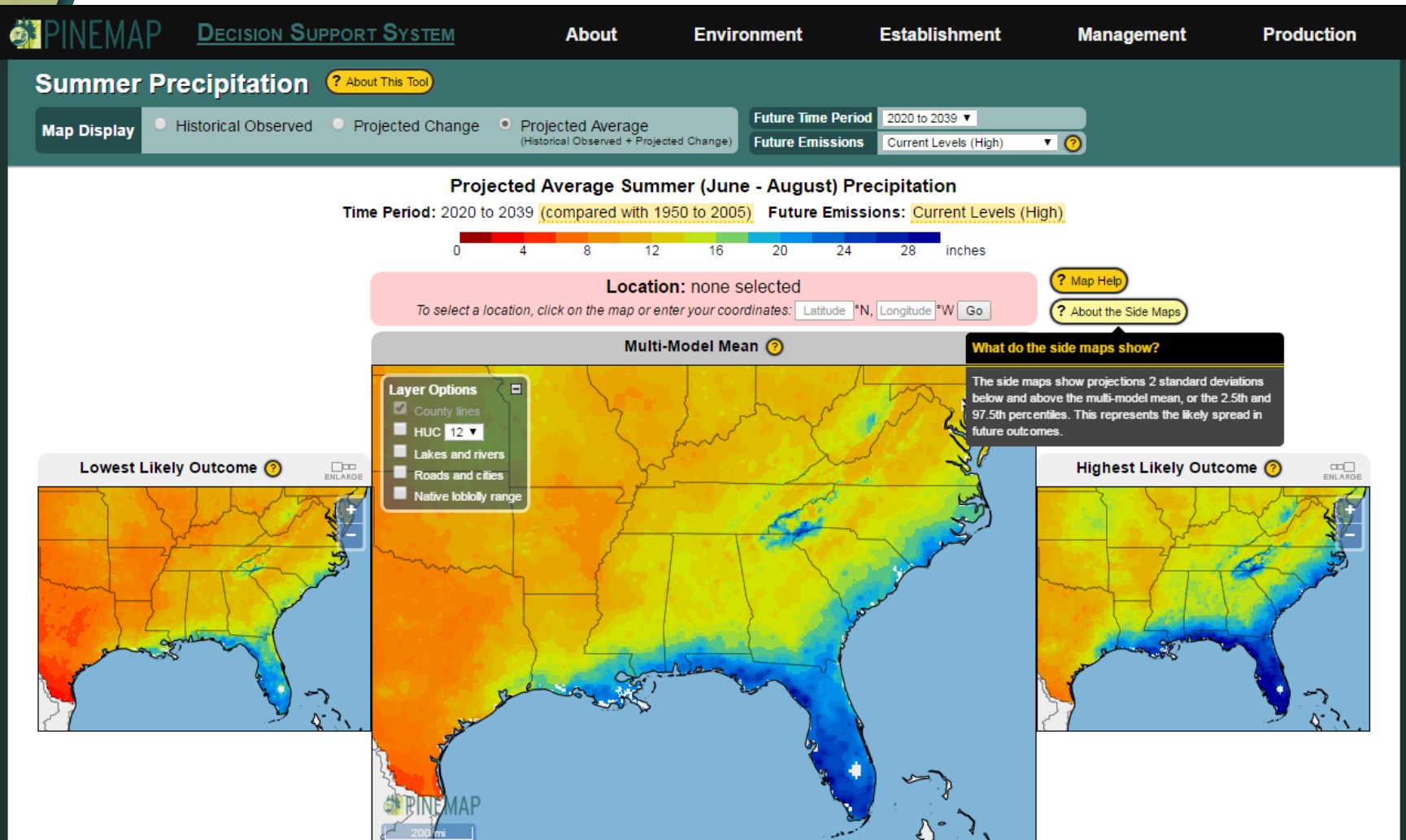
- Embedded help was underused



	FAQ Boxes	Tooltips
Yes	5	3
No	26	28

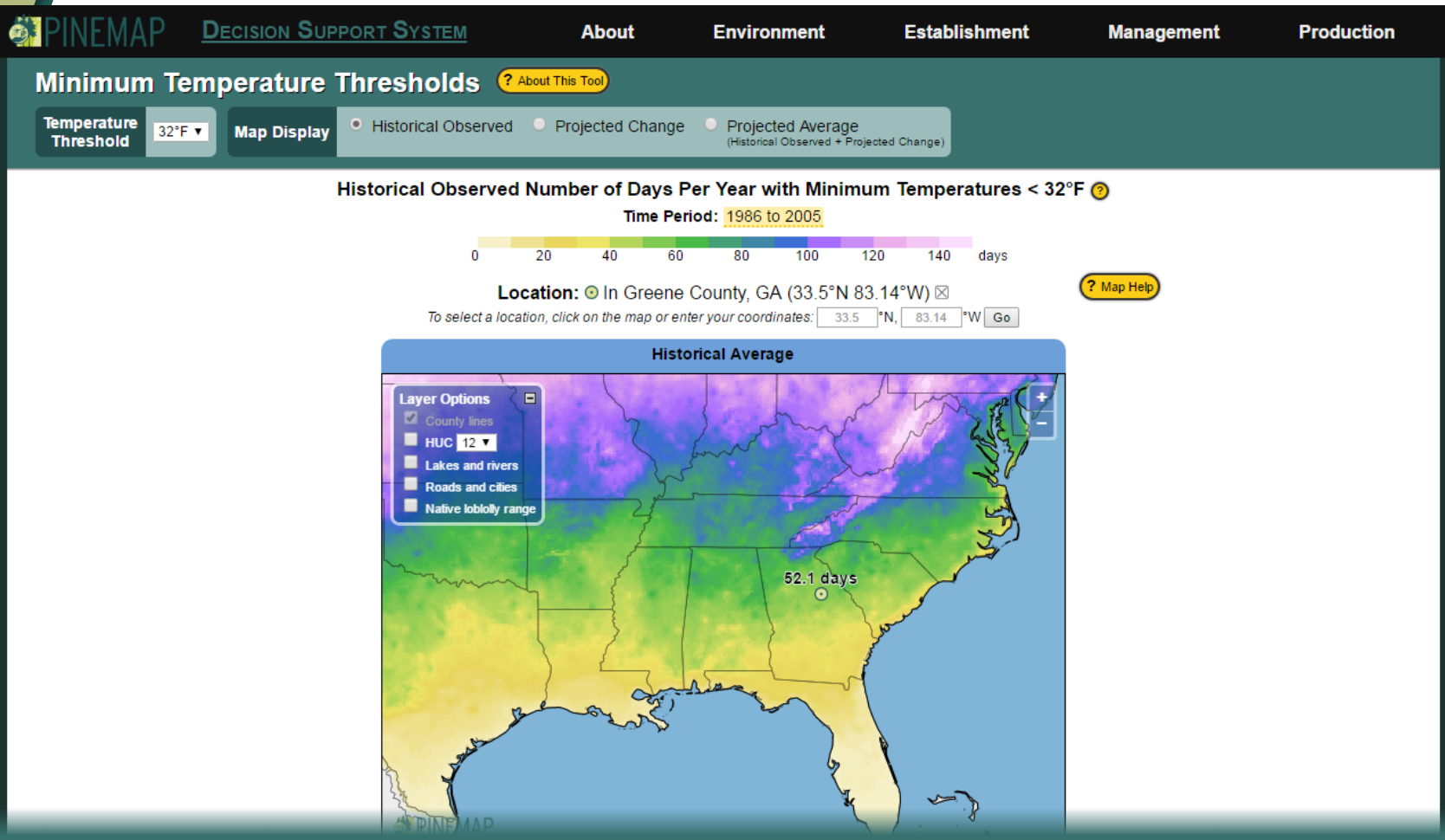
Usability Issues Identified

- Map layer options and overlays weren't clearly visible



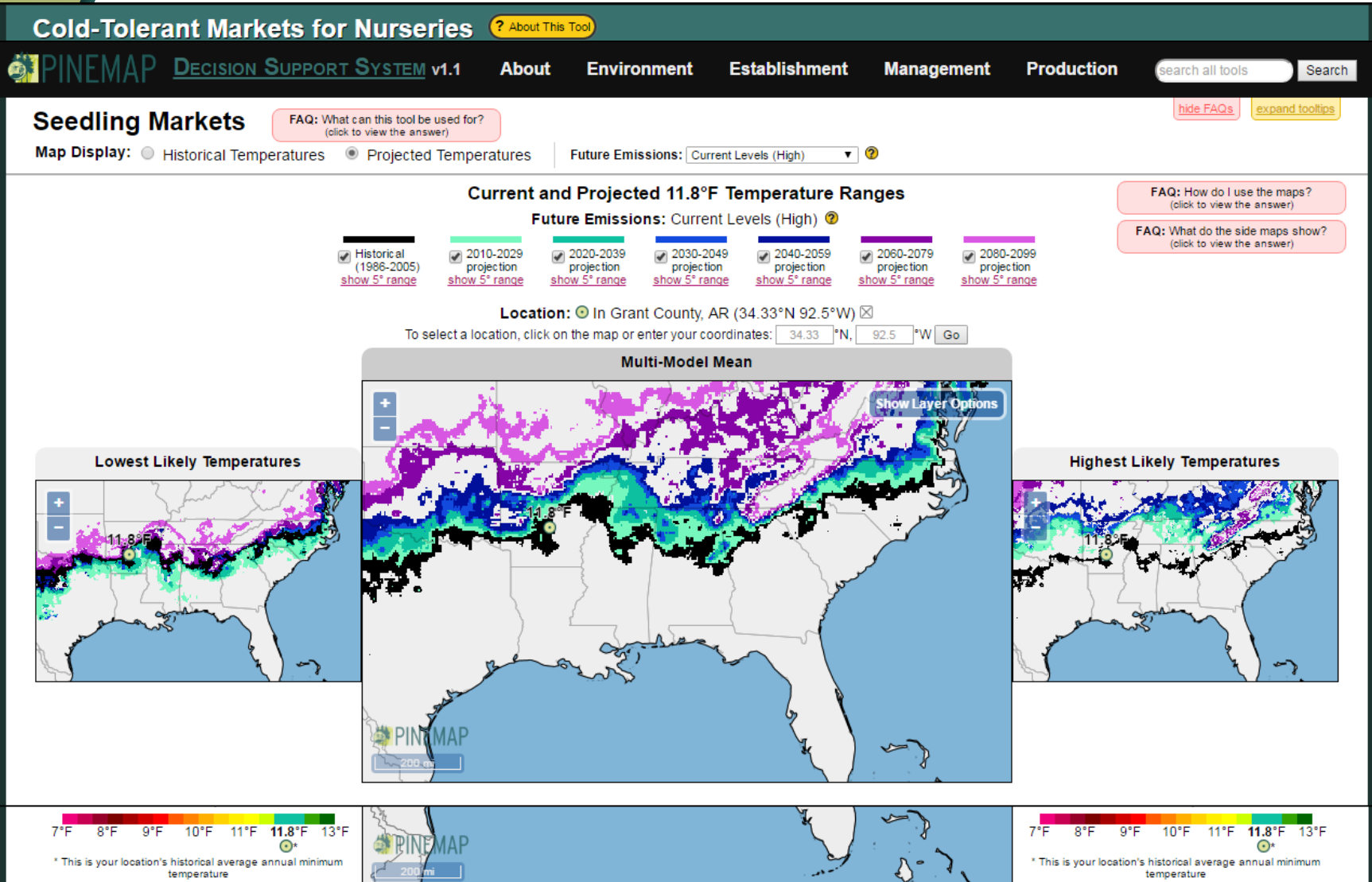
Usability Issues Identified

- Location selection, time series availability were not obvious



Usability Issues Identified

- Users couldn't get to end goal of seedling deployment tools



Today's DSS

- Live demo

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Coming by end of the summer?

- Growing season length
- Forest productivity model outputs
  - gross and net primary productivity
  - net ecosystem productivity
  - merchantable volume
  - carbon above ground
  - water stress
- Market and link to existing tools (help!)
- Others?

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BREAK for questions

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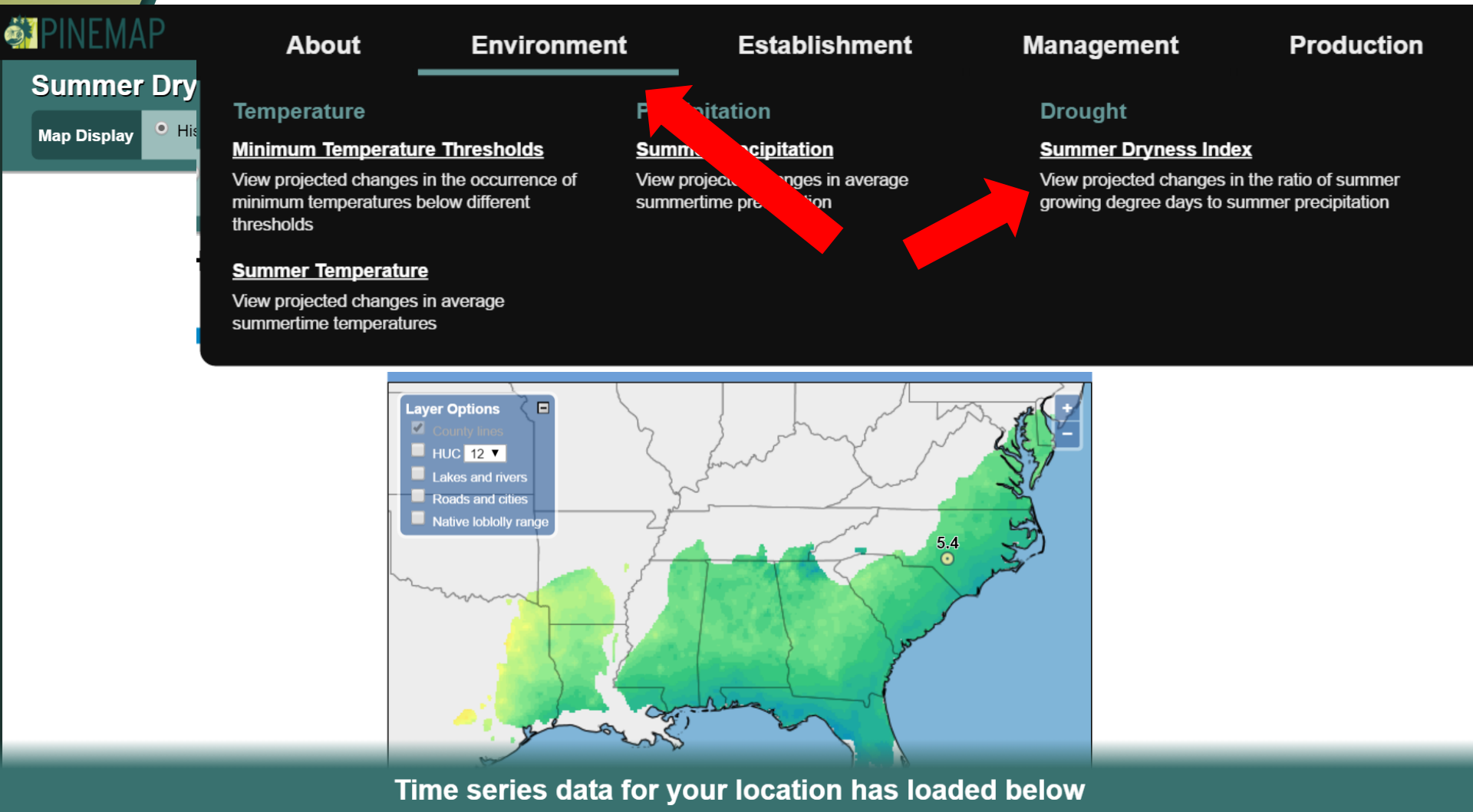
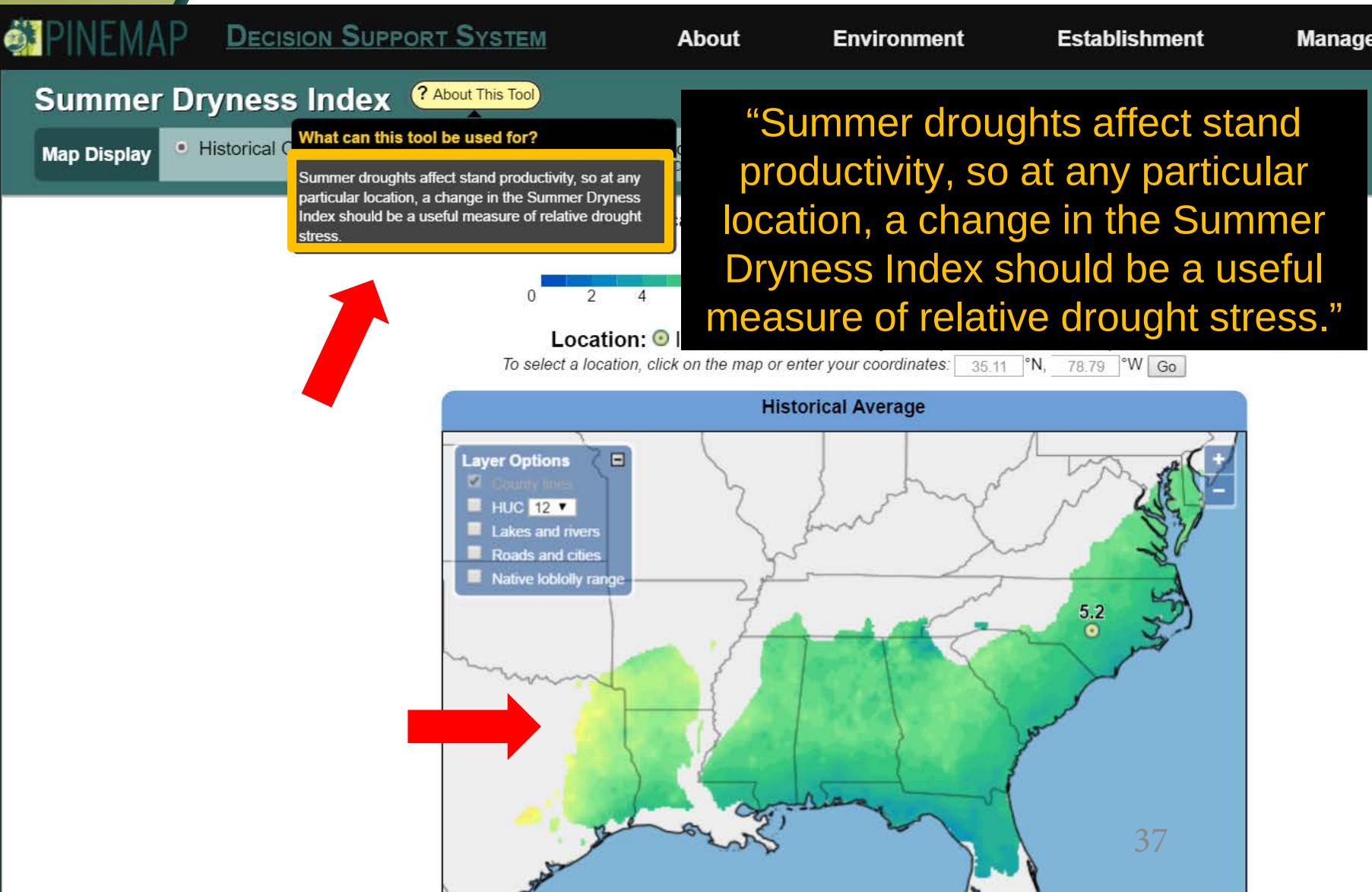
Migrating research outputs into the DSS

- Example with Summer Dryness Index tool



Migrating research outputs into the DSS



"Summer droughts affect stand productivity, so at any particular location, a change in the Summer Dryness Index should be a useful measure of relative drought stress."

Migrating research outputs into the DSS

PINEMAP DECISION SUPPORT SYSTEM | About | Environment | Establishment | Management

Summer Dryness Index

? About This Tool

Map Display: Historical Observed | Projected Change | Projected Average (Historical Observed + Projected Change)

Historical Observed Summer Dryness Index

Time Period: 1986 to 2005

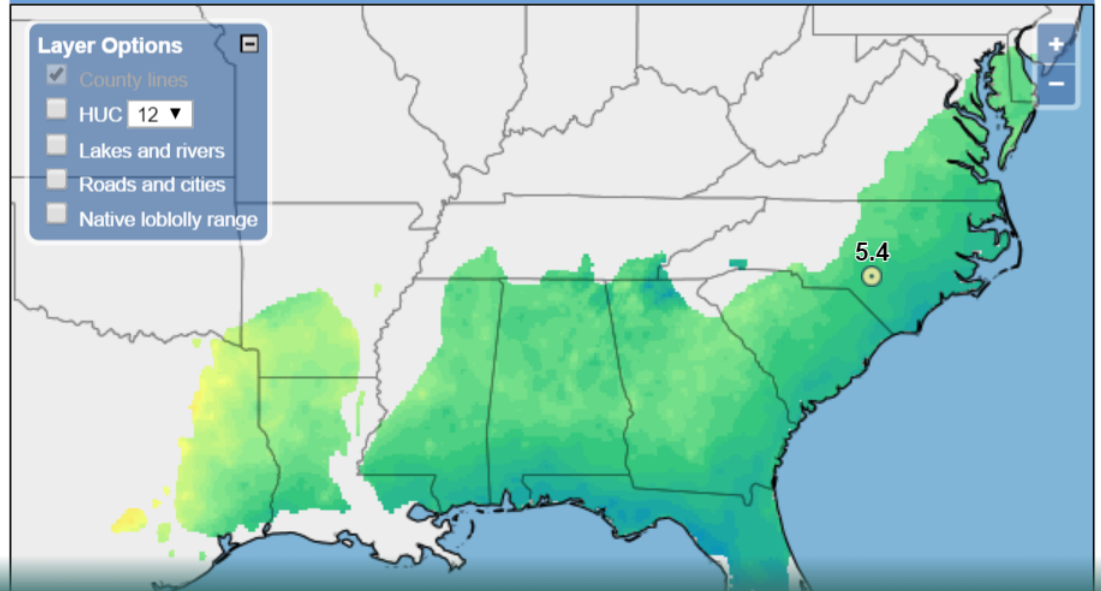
0 2 4 6 8 10 12 14 16 18 20 22 24

Location: In Hoke County, NC (35.06°N 79.1°W)

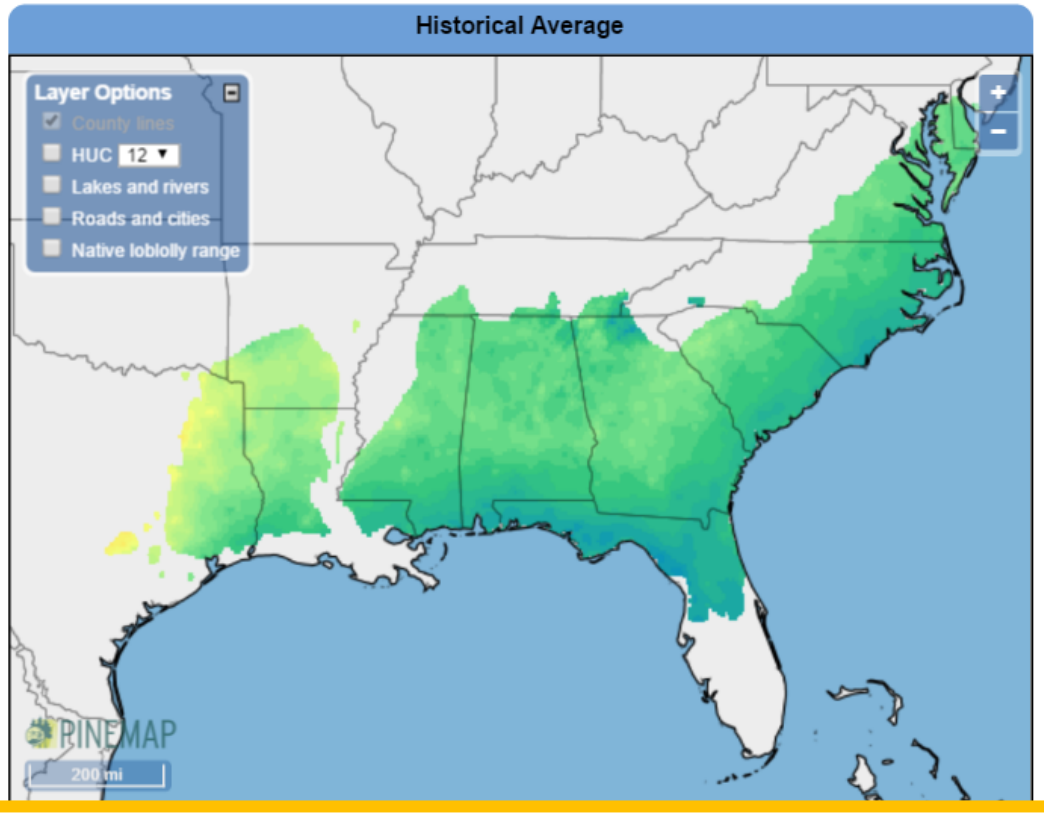
? Map Help

To select a location, click on the map or enter your coordinates: 35.06 °N, 79.1 °W Go

Historical Average



Migrating research outputs into the DSS



Other Resources

- Background: MACA Statistical Downscaling
- Analysis Tips: MACA Statistical Downscaling
- Sabatia, Charles O., and Harold E. Burkhart (2014) **Predicting site index of plantation loblolly pine fr**

For more information on the Summer Dryness Index, contact Dr. Harold Burkhart at Virginia Tech University

Migrating research outputs into the DSS

- Additional items we need from you:
  - **Limitations/caveats**
  - **Data format**
    - NetCDFs, Shapefiles, CSVs ☺
  - **Files needed**
    - Historical average, projected change, projected average, model error
    - Model mean and spread required for projected ones

Migrating research outputs into the DSS

- Handout to be shared post-meeting
- How long will this take?
  - It depends but in general, few days to few weeks
  - Challenges: data format, communicating results to users

BREAK for questions

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Long-term plans

- DSS visualization is innovative
- Committed to long-term support
- Tailoring for mobile devices
- Site-level report summaries

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BREAK for questions/discussion